



Avaya Solution & Interoperability Test Lab

Application Notes for Dell PowerConnect™ 3448P Power over Ethernet (PoE) Switch with Avaya IP Telephones – Issue 1.0

Abstract

These Application Notes describe the configuration of the Dell PowerConnect™ 3448P switch to provide inline Power over Ethernet (PoE) to Avaya IP Telephones and Avaya Wireless Access Points. Avaya IP Telephones and Wireless Access Points successfully obtained power and transferred data over standard Ethernet cables from a Dell PowerConnect™ 3448P layer 2 switch.

1. Introduction

Power over Ethernet (PoE) allows both power and data to be simultaneously carried over standard Ethernet cables. PoE-enabled Ethernet switches can supply power directly to Ethernet devices, thereby simplifying installation and removing the need for separate power supplies for those devices. In the configuration described in these Application Notes, a Dell PowerConnect™ 3448P switch is configured to supply inline PoE to Avaya Powered Devices (PDs), specifically Avaya IP Telephones and Avaya Wireless Access Points.

The Dell PowerConnect™ 3448P allows the prioritization of power to ports. There are three levels of priority that can be assigned. The default priority is labeled “Low”. The highest priority is labeled “Critical” and the middle priority is labeled “High”.

As illustrated in **Figure 1**, the Avaya IP endpoints covered in these Application Notes include the following:

- 4601 IP Telephone
- 4602 IP Telephone
- 4602SW IP Telephones
- 4610SW IP Telephone
- 4620 IP Telephone
- 4620SW IP Telephone
- 4621SW IP Telephone
- 4622SW IP Telephone
- 4625SW IP Telephone
- 4630SW IP Telephone
- 5601 IP Telephone
- 5602SW IP Telephone
- 5610SW IP Telephone
- 5620SW IP Telephone
- Avaya Gen-2 4606, 4612, and 4624 IP Telephones
- Avaya AP-8 Wireless Access Point

The Avaya 4612 and 4624 IP Telephones can be identified as Gen-2 by inspecting the model number. “2A” in the model number indicates Gen-2. The model number can be found by:

- Inspecting the label attached to the bottom of the Telephone.

OR

- Pressing **Mute, V, I, E, W, #** on the keypad and then pressing * until the model number appears. Press # to exit.

An example of a model number is 4606D02A-003 (Gen-2).

The power tests included verification of the following after the product was connected to the switch:

- Successful boot operation.
- For Avaya IP Telephones, successful registration with Avaya Communication Manager or Avaya IP Office (the Avaya 5600-Series IP Telephones are only supported on IP Office), completion of a test call, and raising speakerphone volume to maximum value.
- Connecting a mix of Avaya IP Telephones and a Wireless Access Point to the switch, power cycling the switch and verifying successful boot operation and registration of the devices to IP Office and Avaya Communication Manager.

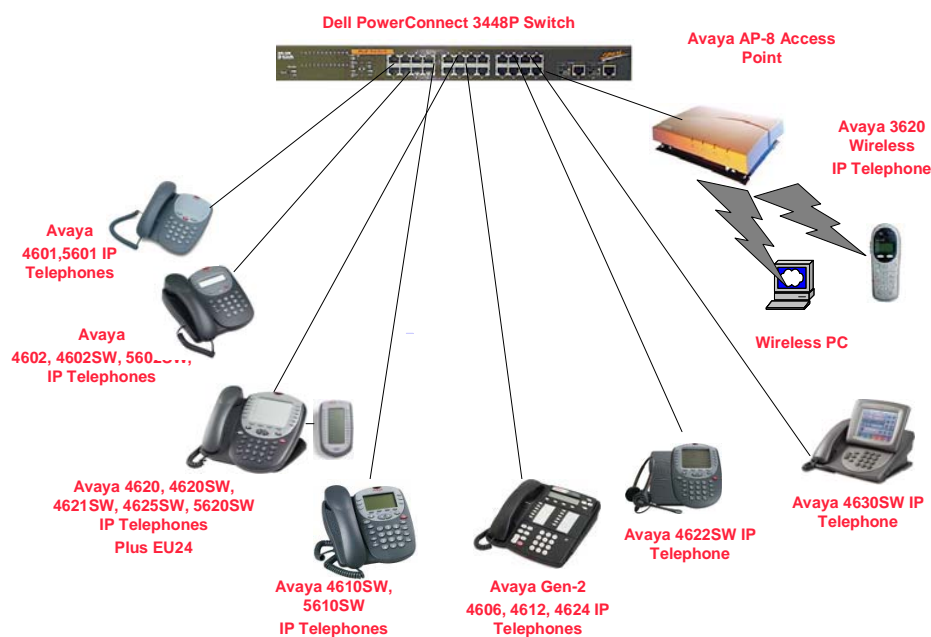


Figure 1: PoE Interoperability Between Dell PowerConnect™ 3448 Layer 2 switch and Avaya IP Telephones

2. Equipment and Software Validated

The following equipment and software/firmware were used for the sample configuration provided:

Equipment	Software/Firmware
Avaya S8300 Media Server with a G350 Media Gateway	3.0.1 (load 346)
Avaya IP Office IP406v2	3.1(29)
Avaya 4601 IP Telephone	2.3
Avaya 4602 IP Telephone	2.3
Avaya 4602SW IP Telephone	2.3
Avaya 4610SW IP Telephone	2.3
Avaya 4620 IP Telephone	2.3
Avaya 4620SW IP Telephone	2.3
Avaya 4621SW IP Telephone (Avaya Communication Manager specific)	2.3
Avaya 4622SW IP Telephone (Avaya Communication Manager specific)	2.3
Avaya 4625SW IP Telephone (Avaya Communication Manager specific)	2.5
Avaya 4630SW IP Screenphone	1.8
Avaya 5601 IP Telephone (IP Office specific)	2.3
Avaya 5602SW IP Telephone (IP Office specific)	2.3
Avaya 5610SW IP Telephone (IP Office specific)	2.3
Avaya 5620SW IP Telephone (IP Office specific)	2.3
Avaya Gen-2 4606 IP Telephone	1.8.3
Avaya Gen-2 4612 IP Telephone	1.8.3
Avaya Gen-2 4624 IP Telephone	1.8.3
Dell PowerConnect™ 3448P switch	1.0.0.112

3. Configure Dell PowerConnect 3448P

This section describes the switch VLAN configuration.

Power over Ethernet (PoE) support is available on all ports of the Dell PowerConnect™ 3448P. The port settings are configured by default to Auto. This enables the Device Discovery protocol to automatically detect when a device is connected that needs power. All Avaya telephones that are in this document automatically get power when connected to the defaulted ports. The Dell PowerConnect™ 3448P switch supports a maximum of 370 Watts. This limits the number of 4620/5620 IP sets that can be simultaneously supported to 46. There was no PoE specific configuration done for this test.

3.1. Getting Started with a New or Initialized System

1. Identify the IP Address, Subnet Mask and Default Gateway that will be used for the Dell PowerConnect™ 3448P switch.
2. Connect to the Dell PowerConnect™ 3448P Switch with its serial cable. Run a terminal emulator, such as HyperTerminal with settings of 9600Kb/s, 8 data bits, 1 stop bit and no parity. Set the flow control to none and change the emulation mode to VT100.
3. Power on the Dell PowerConnect™ 3448P switch. The following Wizard is displayed in the HyperTerminal Window when the Dell PowerConnect™ 3448P switch is turned on with all of the factory defaults.

Welcome to the Dell Easy Setup Wizard
The Setup Wizard guides you through the initial switch configuration and gets you up and running easily and quickly. You can also skip the setup wizard, and enter CLI mode to manually configure the switch if you prefer. You can exit the setup wizard any time by entering [CNTRL+Z]. The system will prompt you with a default answer. By pressing Enter, you accept the default value.

Would you like to skip the setup wizard? [Y/N] N

4. Select **N** and then press **Enter**.
5. The following SNMP screen is presented. Choose to skip this step (Backspace over the Y and type N and then press **Enter**).

The system is not setup for SNMP management by default. To manage the switch using SNMP (required for Dell Network Manager) you can:

- Setup the initial SNMP version 2 account now.
- Return later and setup the SNMP version account. (For more information in setting up a SNMP version 2 account, see the user documentation).

Would you like to setup the SNMP management interface now?
[Y/N]Y
N

6. Configure the accounts and password for the switch.

Now we need to setup your initial privilege (Level 15) user account. This account is used to login to the CLI and Web interface. You may setup other accounts and change privilege levels later. For more information on setting up user accounts and changing privilege levels, see the user documentation.

To setup a user account:

Please enter the user name: **admin**

Please enter the user password: *****

Please reenter the user password: *****

7. Configure the IP Address and Subnet Mask of the Dell PowerConnect™ 3448P.

Next, an IP Address is setup. This IP Address is defined on the default VLAN (VLAN #1), of which all ports are members. This is the IP Address that you use to access the CLI, Web interface or SNMP interface for the switch.

To setup an IP address:

Please enter the IP address of the device (A.B.C.D): **172.16.254.99**

Please enter the IP subnet mask (A.B.C.D or /nn): **255.255.255.0**

8. Configure the Gateway.

Finally, setup the default gateway. Please enter the IP address of the gateway from which the network is reachable (e.g. 192.168.1.1): **172.16.254.4**

This is the configuration information that has been collected:

SNMP Interface="Dell Network Manager"@192.168.1.10

User Account setup = admin

Password = *****

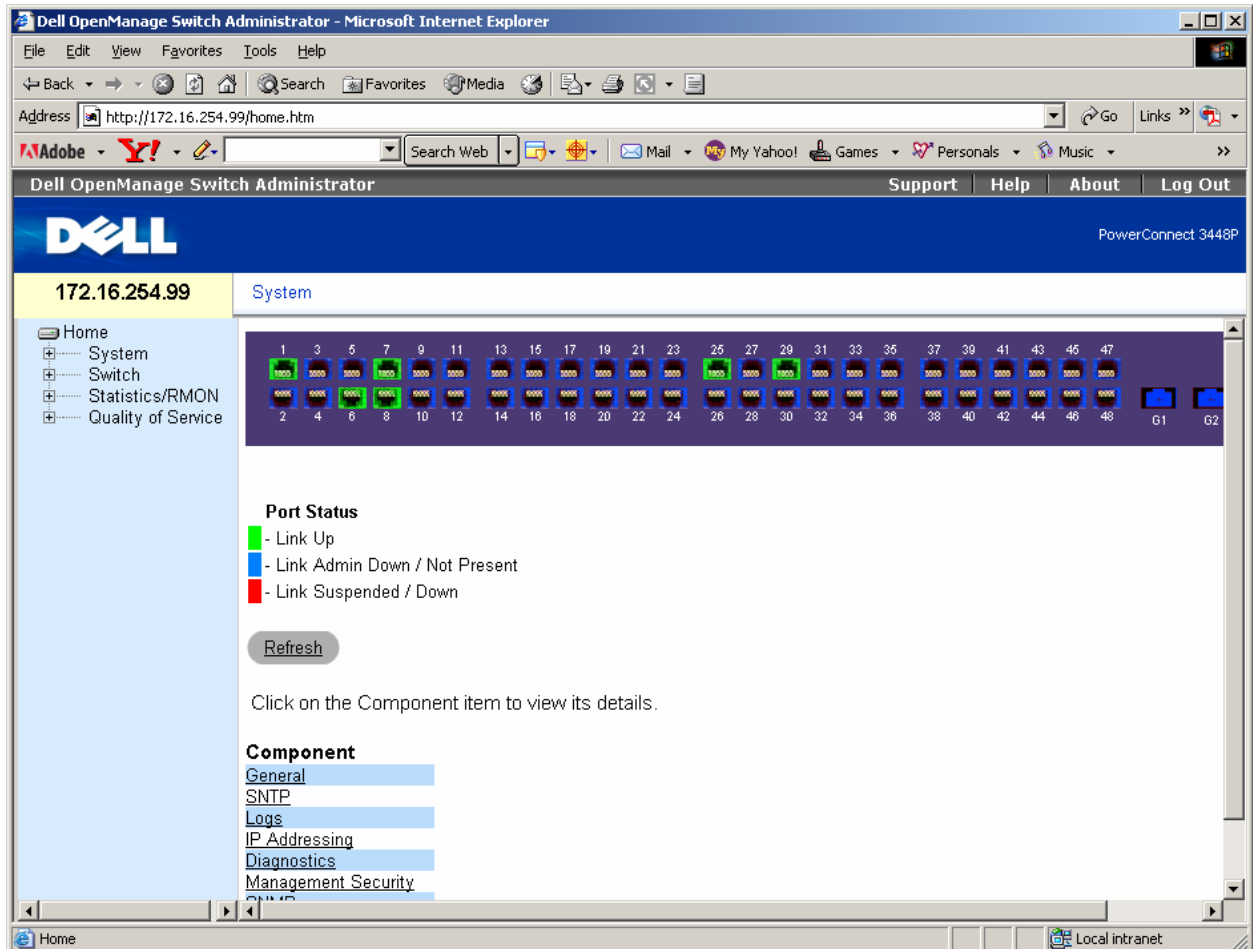
Management IP Address = 172.16.254.99 255.255.255.0

Default Gateway = 172.16.254.4

If the information is correct, please select [Y] to save the configuration, and copy to the start-up configuration file.

If the information is incorrect, select [N] to discard configuration and restart the wizard: [Y/N]: **Y**

9. Configure a PC to have an IP address on the same subnet as the Dell PowerConnect™ 3448P switch, cable it to one of the switch 10/100 ports (that should be on the default VLAN). Open a browser to the management address (that was configured in Step 7) and log in with the admin login and password (that was configured in Step 6).



10. Create a VLAN for the Voice VLAN. Select **Switch->VLAN->VLAN Membership**.

Press **Add**. This opens up a new browser. Enter the VLAN ID for the Voice VLAN and a Name. Press **Apply Changes**. Go back to the main VLAN screen and press **Refresh**. The newly created VLAN is now displayed.

The screenshot shows a web browser window titled "Create New VLAN - Microsoft Internet Explorer". The page has a blue header with the text "Create New VLAN". In the top right corner, there is a "Refresh" button. The main content area is a light blue box containing two input fields: "VLAN ID (2-4093)" with the value "209" and "VLAN Name (0-32 characters)" with the value "209Voice". Below these fields is an "Apply Changes" button.

11. Add ports to the VLAN. Select **Switch->VLAN->VLAN Membership**. Change the ports to be in the VLAN created in the last step. Press **Show All**. This opens a new browser. Change the Access to **General** and the PVID (Port VLAN ID) to the VLAN number created in the previous step (in this case 209). Press **Apply Changes**. For this configuration, ports 5 - 12 were chosen.

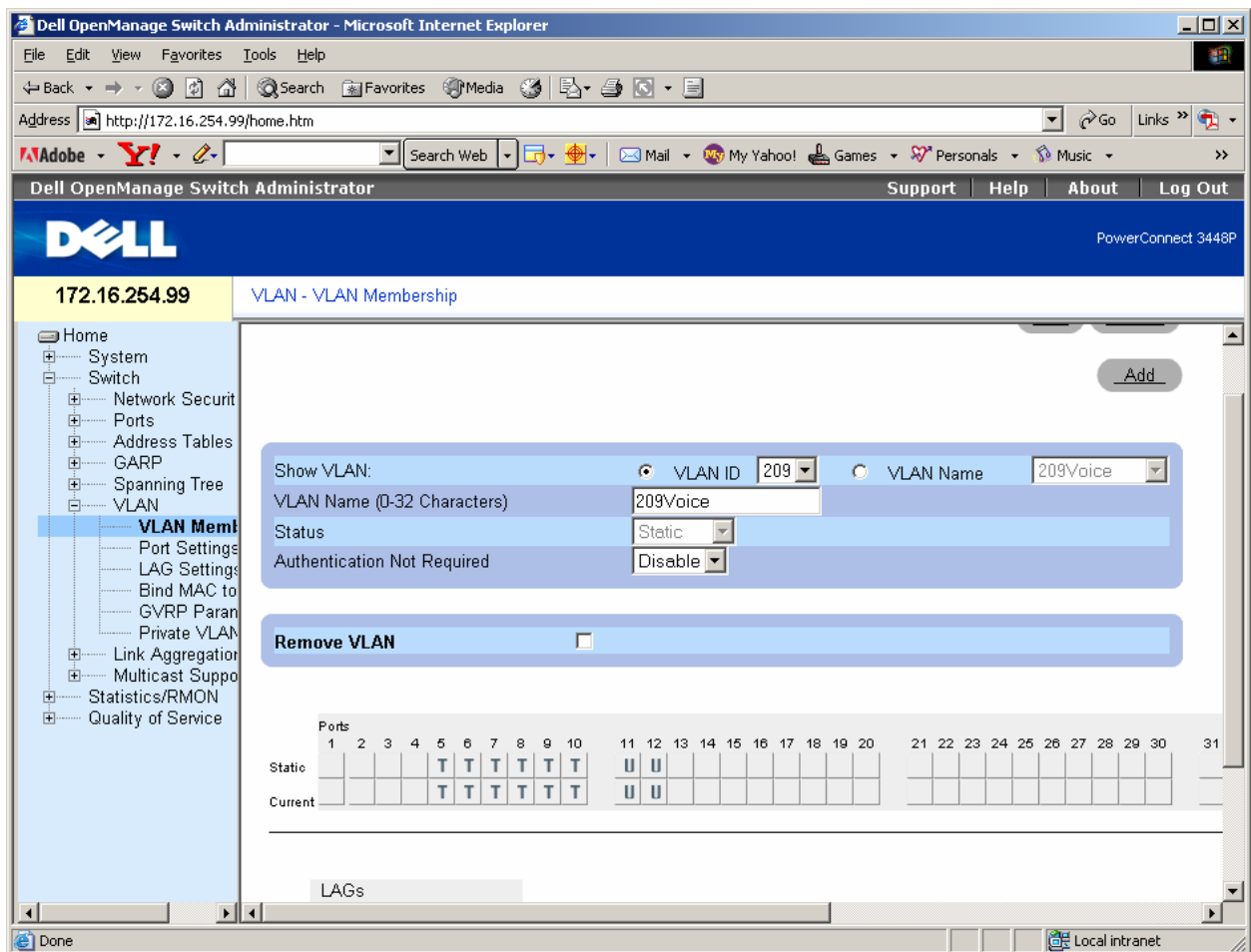
VLAN Port Table - Microsoft Internet Explorer

VLAN Port Table Refresh

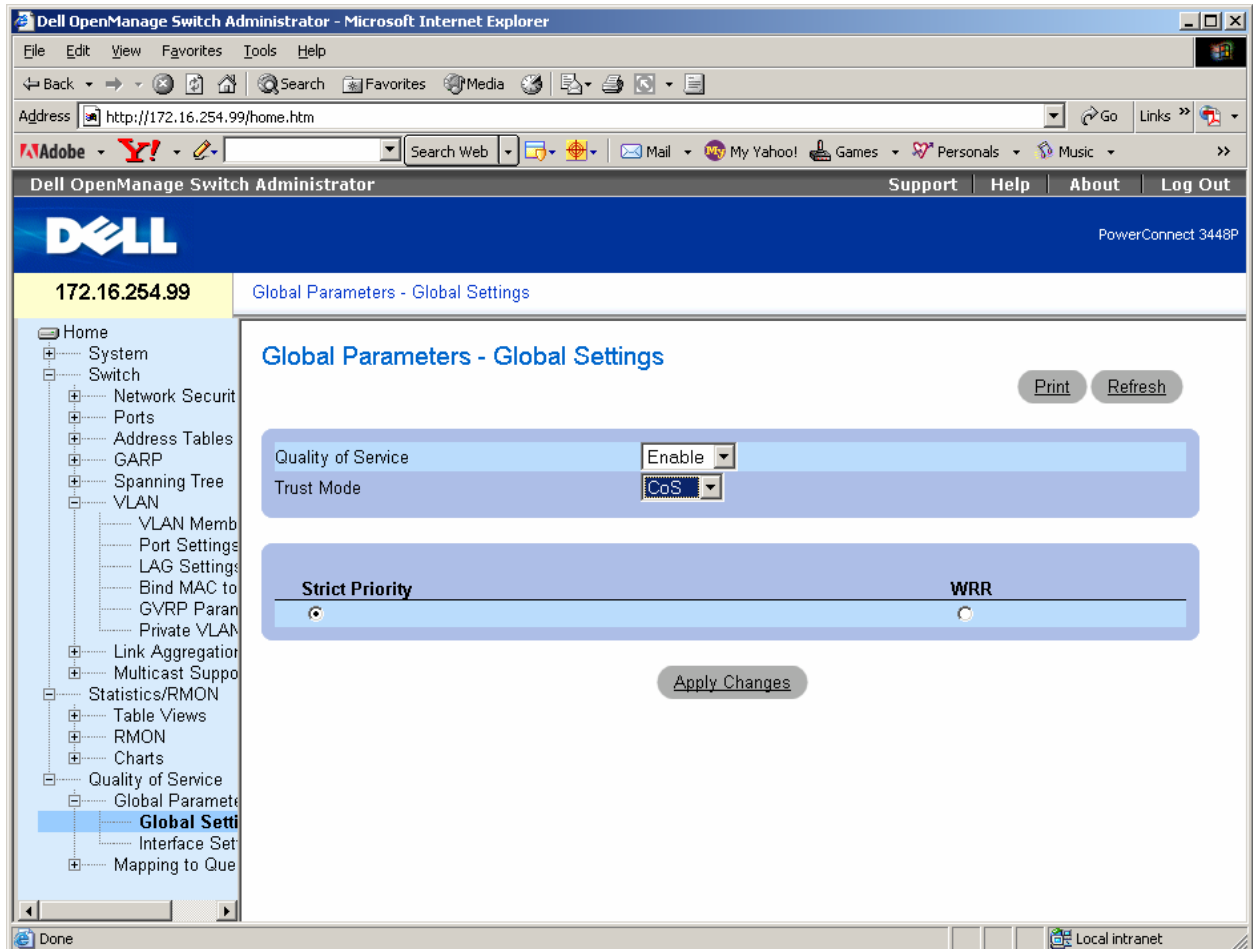
	Port	Port VLAN Mode	Dynamic	PVID	Frame Type	Ingress Filtering	Current Reserved VLAN	Reserve VLAN for Internal Use
1	e1	Access	<input type="checkbox"/>	1	Admit All	Enable		
2	e2	Access	<input type="checkbox"/>	1	Admit All	Enable		
3	e3	Access	<input type="checkbox"/>	1	Admit All	Enable		
4	e4	Access	<input type="checkbox"/>	1	Admit All	Enable		
5	e5	General	<input type="checkbox"/>	209	Admit All	Enable		
6	e6	General	<input type="checkbox"/>	209	Admit All	Enable		
7	e7	General	<input type="checkbox"/>	209	Admit All	Enable		
8	e8	General	<input type="checkbox"/>	209	Admit All	Enable		
9	e9	General	<input type="checkbox"/>	209	Admit All	Enable		
10	e10	General	<input type="checkbox"/>	209	Admit All	Enable		
11	e11	General	<input type="checkbox"/>	209	Admit All	Enable		
12	e12	General	<input type="checkbox"/>	209	Admit All	Enable		
13	e13	General	<input type="checkbox"/>	60	Admit All	Enable		
14	e14	General	<input type="checkbox"/>	60	Admit All	Enable		
15	e15	General	<input type="checkbox"/>	60	Admit All	Enable		
16	e16	General	<input type="checkbox"/>	60	Admit All	Enable		
17	e17	General	<input type="checkbox"/>	60	Admit All	Enable		
18	e18	General	<input type="checkbox"/>	60	Admit All	Enable		
19	e19	General	<input type="checkbox"/>	60	Admit All	Enable		
20	e20	General	<input type="checkbox"/>	60	Admit All	Enable		

12. Tag the appropriate ports on the VLAN. Select **Switch->VLAN->VLAN Membership**.

All IP telephone ports must be tagged. The Telephony server (IP Office or Avaya Communication Manager and the PC running IP Office Manager must be Untagged (in this example, the telephone ports are 5 – 10 and the IP Office and IP Office Manager ports are 11 and 12. Press the top box for the port once for Tagged (indicated by a **T**) and a second time for Untagged (indicated by a **U**). By default the default VLAN (VLAN 1) is assigned to the ports untagged and so will be available to PCs that are connected to the IP telephones. Once completed, scroll down and press the **Apply Changes** button.



13. Configure QoS for the IP Phone ports. Select **Quality of Service->Global Parameters->Global Settings**. Select **Enable** for Quality of Service and **CoS** for Trust Mode.



14. Enable the CoS for the IP Office, Avaya Communication Manager and IP Telephones.. This gives priority to the Voice calls. Select **System->Power Over Ethernet**. Press **Show All**. This opens a new browser. For each IP Telephone port, select the appropriate Power Service and set the Default CoS for Incoming calls to **7**. Scroll down and press **Apply Changes** when done.

Interface Table - Microsoft Internet Explorer

Interface Table

Refresh

	Interface	Trust Mode	Default CoS for Incoming Traffic
1	e1	Enable	0
2	e2	Enable	0
3	e3	Enable	0
4	e4	Enable	0
5	e5	Enable	7
6	e6	Enable	7
7	e7	Enable	7
8	e8	Enable	7
9	e9	Enable	7
10	e10	Enable	7
11	e11	Enable	7
12	e12	Enable	7
13	e13	Enable	0
14	e14	Enable	0
15	e15	Enable	0
16	e16	Enable	0
17	e17	Enable	0
18	e18	Enable	0
19	e19	Enable	0
20	e20	Enable	0
21	e21	Enable	0

15. Select the power priority for the IP Telephones. Select **System->Power Over Ethernet**. Press **Show All**. This opens a new browser. For each IP Telephone port, select the appropriate Priority Level. Scroll down and press **Apply Changes** when done.

Power over Ethernet Table - Microsoft Internet Explorer

Power over Ethernet Table

Refresh

Port		Admin Status	Oper. Status	Priority Level	Power Classification	Powered Device
1	e1	Auto	Searching	Low	Class 0	
2	e2	Auto	Searching	Low	Class 0	
3	e3	Auto	Searching	Low	Class 0	
4	e4	Auto	Delivering Power	Low	Class 2	
5	e5	Auto	Searching	Critical	Class 2	
6	e6	Auto	Searching	Low	Class 0	
7	e7	Auto	Searching	Low	Class 2	
8	e8	Auto	Searching	Low	Class 0	
9	e9	Auto	Searching	High	Class 2	
10	e10	Auto	Searching	Low	Class 0	
11	e11	Auto	Searching	Low	Class 0	
12	e12	Auto	Searching	Low	Class 2	
13	e13	Auto	Searching	Low	Class 0	
14	e14	Auto	Searching	Low	Class 0	
15	e15	Auto	Searching	Low	Class 2	
16	e16	Auto	Searching	Low	Class 2	
17	e17	Auto	Searching	Low	Class 0	
18	e18	Auto	Searching	Low	Class 0	

4. Testing

The interoperability testing focused on verifying PoE interoperability between the Dell PowerConnect™ 3448P and Avaya IP Telephones.

4.1. General Test Approach

The general test approach was to connect the Avaya IP Telephones to ports on the Dell PowerConnect™ 3448P. IP Telephones were allowed to power up and initialize. The IP Telephones were registered to each Telephony Server in turn and calls were made. The volume of the speakerphone, if any, was set to maximum to draw the most power and the power draw as measured by the Dell PowerConnect™ 3448P switch was recorded. Telephony quality in the presence of saturating data traffic was also tested.

4.2. Test Results

All Power over Ethernet test cases completed successfully. The Dell PowerConnect™ 3448P successfully provided inline power to the Avaya IP telephones. **Table 1** below lists the 802.3af class, allocated power, and measured power of the Avaya IP telephones when connected to the Dell PowerConnect™ 3448P. The measured power listed is for an idle phone. Cable length and impedance affects power usage, so the measurements listed here may vary based on the cable used.

Avaya Powered Device	802.3af Class	Allocated Power (W)	Measured Power (W) (Idle)	Observations
4601	2	6.95	3.1	See Note 1
4602	1	3.8	3.0	
4602SW	2	6.95	3.3	
4610SW	2	6.95	3.3	
4620	3	12.95	7.0	
4620SW	3	12.95	5.2	
4621SW	2	6.95	5.1	
4622SW	2	6.95	5.1	
4625SW	3	12.95	8.0	
4630	3	12.95	10.7	
5601	2	6.95	2.7	See Note 1
5602SW	1	3.8	3.3	
5610SW	2	6.95	3.3	
Gen-2 4606	0	12.95	5.3	
Gen-2 4612	0	12.95	5.1	
Gen-2 4624	0	12.95	5.0	
AP-8	0	12.95	4.2	

Table 1: 802.3af Class, Allocated Power, and Measured Power for Avaya IP Telephones connected to Dell PowerConnect™ 3448P.

Table 2 below summarizes the 802.3af classes.

Class	PSE Output Max. Power (W)
0	12.95
1	3.8
2	6.95
3	12.95
4	Treat as Class 0

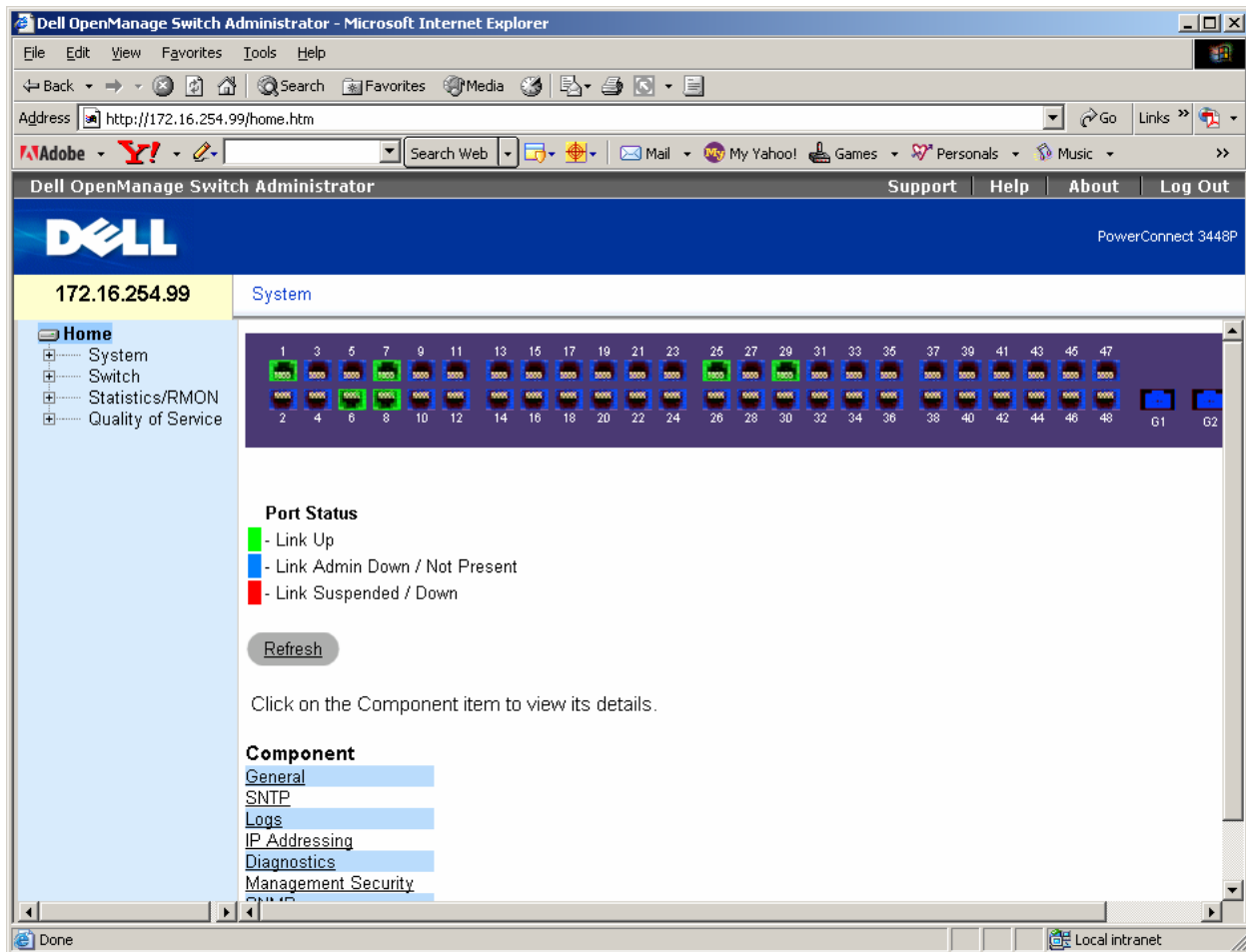
Table 2: IEEE 802.3af PSE and Powered-Device Power Classifications.

Note 1: The 4601 and 5601 IP Telephones do not have a speakerphone.

5. Verification and Troubleshooting

If an IP telephone does register, check the following:

- Unplug the set and plug it back in. When prompted, press *. Verify that all IP Addresses and VLANs are correct. Plug the IP telephone directly into the Dell PowerConnect™ 3448P if possible. Select **Home** on the browser interface (see below) and verify that the ports are working properly. Do this by checking that the ports show green (indicating the link is up).



- Check the Global Power Status. Select **System->General->Power Over Ethernet**. Check that there is power left (the **Consumed Power (Watts)** must be 370 or less).

The screenshot shows the Dell OpenManage Switch Administrator web interface in Microsoft Internet Explorer. The browser address bar shows `http://172.16.254.99/home.htm`. The page title is "Dell OpenManage Switch Administrator". The Dell logo is visible in the top left, and "PowerConnect 3448P" is in the top right. The left navigation pane shows a tree structure with "System" expanded, "General" selected, and "Power over Ethernet" highlighted. The main content area is titled "General - Power over Ethernet" and contains two sections: "Global" and "Port Settings".

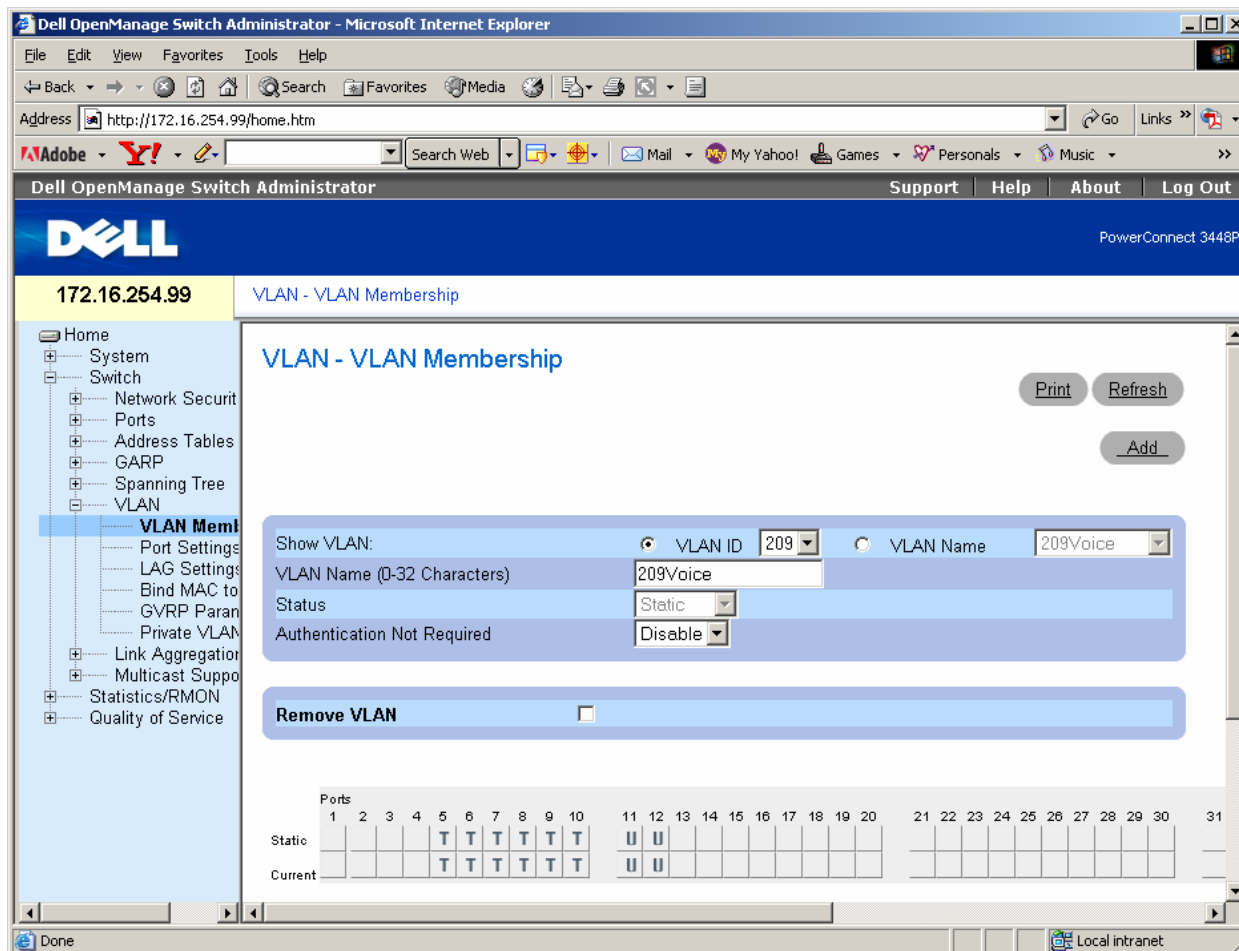
Global

Power Status	On
Nominal Power (Watts)	370
Consumed Power (Watts)	13
System Usage Threshold (1-99 Percent)	95
Traps	Disable

Port Settings

Select a Port	e1
PoE Admin Status	Auto
PoE Operational Status	Searching
Power Priority Level	Low
Power Classification	Class 0
Powered Device (0-24 Characters)	
Overload Counter	0
Short Counter	0
Denied Counter	0
Absent Counter	0
Invalid Signature Counter	0

- Check that the ports are correctly marked as tagged or untagged.
- Select **Switch->VLAN->VLAN Membership**. Verify the IP Telephone ports show **T** and the Telephony Server port (IP Office or Avaya Communication Manager) shows **U**.



6. Conclusion

These Application Notes describe the steps for configuring the Dell 3448P PowerConnect switch to provide inline Power over Ethernet (PoE) to the Avaya PDs, namely Avaya IP Telephones and Avaya Wireless Access Points. During compliance testing, the Avaya PDs simultaneously obtained power and transferred data over standard Ethernet cables from the Dell 3448P PowerConnect layer 2 switch.

7. Additional References

- Product documentation for Avaya products may be found at <http://support.avaya.com>.
- Product documentation for Dell products may be found at: <http://www.Dell.com>.

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